

Hydrologic budgets of the ORW mitigation wetland, 1998-99

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Introduction

Understanding hydrologic processes of mitigation wetlands is fundamental key in effective ecosystem restoration and creation (Mitsch and Gosselink, 2000). One indicator of success for constructed wetlands is the fulfillment of the hydrology criterion (National Research Council, 1995). Hydrologic budgets, therefore, provide valuable information to meet restoration and creation goals.

The 3-ha mitigation wetland (the billabong) at the Olentangy River Wetland Research Park, constructed in the Summer of 1996, is a freshwater, oxbow wetland that receives water from the Olentangy River. When the river level is higher than the wetland, water passively flows into

the wetland through a check valve and eventually returns to the Olentangy River through a control weir. Previous hydrologic budgets from beginning were presented in Wang et al. (1997) and Johnson et al. (1998). This paper presents monitoring hydrologic budgets for 1998 and 1999.

Methods

Location of the inflow and outflow of the billabong is shown in Figure 1. A twice-daily reading (staff gauges) was used to measure surface water level of the Olentangy River and mitigation wetland. The following equation (Mitsch and Gosselink, 1993) was used to determine hydrologic budgets for the mitigation wetland:

$$\Delta V/\Delta t = Q_{in} + Q_{out} + G_{in/out} + P_{reci} - ET \quad (1)$$

Where

$\Delta V/\Delta t$ = Change of water volume in wetland over time,

Q_{in} = Inflow,

Q_{out} = Surface outflow,

$G_{in/out}$ = Ground water exchange,

P_{reci} = Precipitation,

ET = Evapotranspiration.

All parameters (water inflows, outflows, water volume, precipitation and evapotranspiration, and groundwater) in equation (1) were calculated by the following equations (Wang et al., 1997):

Inflow

$$S_i = 1.8447ah^{1/2} \quad (2)$$

$$a = 0.7372D + 1.387D^2 - 0.39993D^3 \quad (3)$$

= cross sectional area, ft

$$L_r = 723 + L_s \quad (4)$$

where

D = water depth in pipe at weir box (ft)

= $\min(d, \max(0, L_r - 723.5))$

h = head causing flow (ft)

= $\max(0, \min(L_r - L_m, L_r - 0.6D - 723.5))$

L_r = river water level (ft above MSL)

L_s = staff gauge reading, ft

L_m = mitigation wetland water level (ft above MSL)

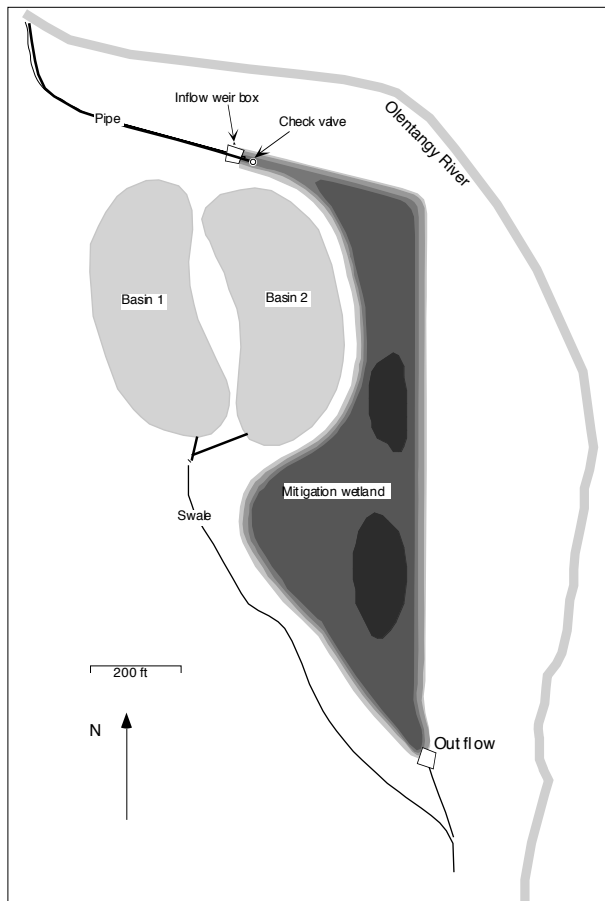


Figure 1. Location of the mitigation wetland at ORWRP.

Outflow

$$S_0 = 10.16h_0^{1.436} \quad (4)$$

where

$$h_0 = L_m - 724.2 \quad (L_m > 724.2)$$

$$= 0 \quad (L_m \leq 724.2)$$

Surface water volume

Surface water volume was based on relationships between surface area, volume, and elevation. A detailed modeling approach was given by Wang et al. (1997). The following equation was used to calculate water volume (V , ft^3) of the mitigation wetland:

$$V = 3.5873 \times 10^4 L_m - 2.5938 \times 10^7 \quad (0 < L_m < 723.5)$$

$$= 6.8425 \times 10^9 - 1.9121 \times 10^7 L_m + 1.336 \times 10^4 L_m \quad (723.5 < L_m < 727.0) \quad (5)$$

Daily precipitation and ET

Daily precipitation and evapotranspiration data were extracted from the weather station (Mitsch et al., 1995) at ORWRP.

Groundwater exchange

The difficulties of evaluating groundwater seepage for the mitigation wetland were presented in Wang et al. (1997). The residuals, however, were used to estimate groundwater indirectly after balancing all other components of the hydrologic budgets (eqn. 1).

Results and Discussion

Figure 2 shows the hydroperiod of the wetland and the Olentangy River, for 1998 and 1999. General water level trends of the billabong follow a pattern of high water levels in the early growing season, followed by drier conditions in late summer. This early flooding followed by summer drawdowns is typical of Midwest marshes (Mitsch, 1992). These flood events provide nutrients and introduction of seeds and small organisms across a watershed (Mitsch and Gosselink, 2000).

Figure 3 presents the relationships between surface water level (ft above MSL) and wet area (%) of the total mitigation wetland area, and wet periods (days) during two growing seasons (a: from April 20 to October 20; and b: from May 1 to October 31 during the period, 1998-99. A summary of the wet days and wet area for the two growing seasons is given in Table 1.

Table 1. A summary of the wet days and wet area for the two growing seasons.

wet area%	68	72	82
growing seasons	wet days		
April 20 - October 19			
1998	110	57	5
1999	89	35	3
May 1 - October 31			
1998	111	45	5
1999	91	24	

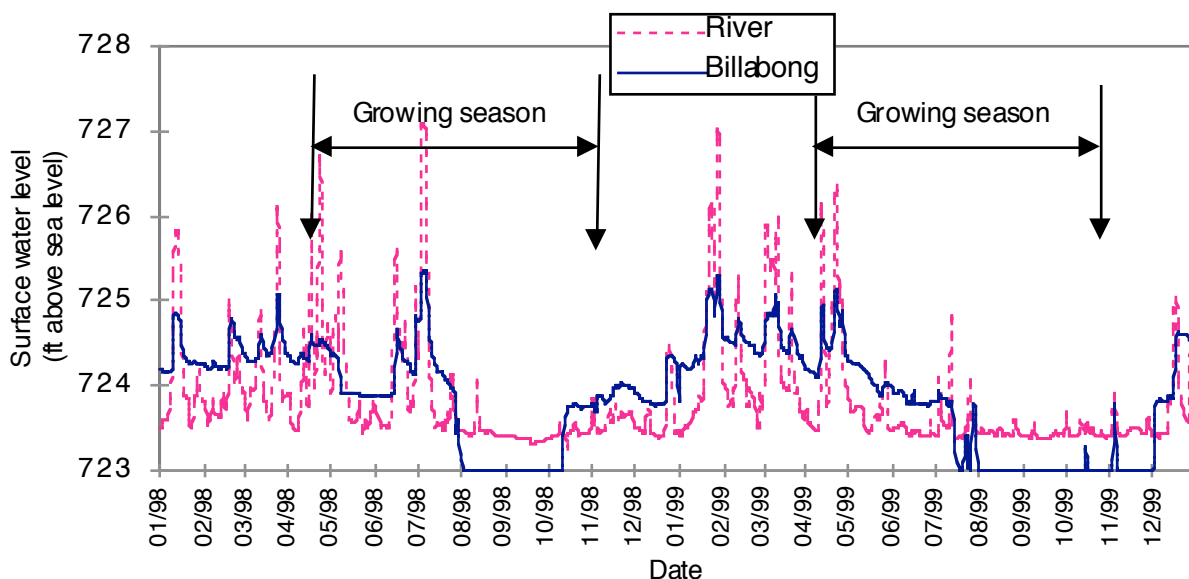


Figure 2. Daily surface water level (ft above sea level), 1998-99

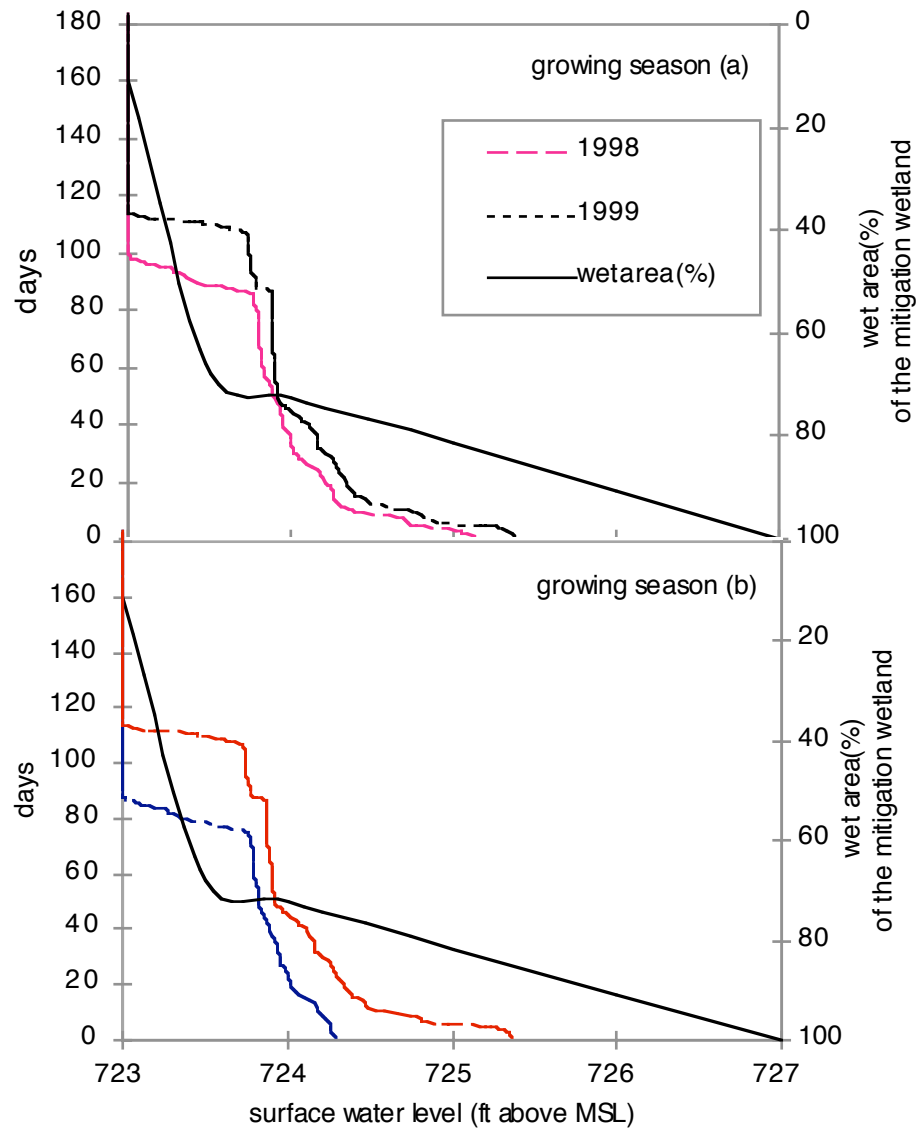


Figure 3. Relationship of surface water level to wet days and wet area (%) of the billabong during the growing seasons (a and b), 1998-99.

Table 2. Estimated annual hydrologic budgets, 1998-99.

hydrologic parameters	98 (m/yr)	99 (m/yr)
Surface inflow from river	10.36	9.25
Surface outflow	9.80	9.08
Precipitation	0.71	0.60
Evapotranspiration	1.47	0.91

The wet periods are longer than the hydrologic critical days which were given by National Research Council (1995) for wetland delineations and indicate that the design of this wetland was successful in establishing appropriate hydrologic conditions for a Midwest oxbow wetland.

Table 2 shows the annual hydrologic budgets for 1998-99. Daily values are given in Appendix 1. By comparison, total inflow (10.36 m/yr) and outflow (9.80 m/yr) from the river in 1998 were higher than the inflow (9.25 m/yr) and outflow (9.08 m/yr) in 1999, respectively. Total precipitation (0.71 m/yr) and evapotranspiration (1.42 m/yr) in 1998 were also wetter than total precipitation (0.60 m/yr) evapotranspiration (0.91 m/yr) in 1999, respectively.

References

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Appendix A. Estimated daily hydrologic budgets for the billabong at ORWRP, 1998-99.

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
01/01/98	723.51	724.20	142147	0	0	265	1303
01/02/98	723.51	724.20	142248	0	7	0	508
01/03/98	723.61	724.15	131097	0	0	531	136
01/04/98	723.61	724.15	131054	0	0	0	471
01/05/98	723.61	724.15	131012	0	0	5571	611
01/06/98	723.61	724.15	130969	0	0	1326	278
01/07/98	723.61	724.15	131530	0	0	33957	0
01/08/98	723.79	724.15	130927	0	0	5571	384
01/09/98	724.66	724.28	160238	106145	11771	5306	224
01/10/98	725.32	724.78	276944	213973	201935	0	1270
01/11/98	725.76	724.87	298843	323446	248805	0	1623
01/12/98	725.84	724.86	295953	338130	242479	0	175
01/13/98	725.82	724.83	289717	334896	228971	531	1339
01/14/98	725.79	724.82	285956	328862	220919	0	1804
01/15/98	725.28	724.76	271784	207746	191266	1857	39
01/16/98	724.75	724.61	235808	73776	121438	0	479
01/17/98	724.15	724.39	186150	0	41782	2122	194
01/18/98	723.90	724.35	175585	0	28278	0	102
01/19/98	723.88	724.31	167357	0	18907	0	1160
01/20/98	723.86	724.30	163893	0	15311	0	445
01/21/98	723.85	724.27	159087	0	10716	0	524
01/22/98	723.60	724.26	155608	0	7713	3184	240
01/23/98	723.49	724.25	153072	0	5721	6898	141
01/24/98	723.81	724.30	165317	0	16762	0	515
01/25/98	723.88	724.30	163862	0	15280	0	445
01/26/98	723.89	724.27	158592	0	10271	0	1165
01/27/98	724.03	724.26	156081	0	8104	0	1199
01/28/98	724.19	724.26	154756	0	7024	0	1867
01/29/98	724.02	724.26	155699	0	7788	265	272

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
01/30/98	723.84	724.27	157473	0	9286	0	210
01/31/98	723.81	724.27	157909	0	9667	0	599
02/01/98	723.81	724.24	151803	0	4794	0	4726
02/02/98	723.79	724.24	150943	0	4194	0	0
02/03/98	723.67	724.23	148959	0	2908	0	2904
02/04/98	723.53	724.22	146323	0	1442	0	533
02/05/98	723.59	724.20	143088	0	170	5306	318
02/06/98	723.84	724.25	153123	0	5759	6632	4045
02/07/98	723.71	724.27	158792	0	10450	0	0
02/08/98	723.66	724.25	153353	0	5933	0	4565
02/09/98	723.67	724.23	148639	0	2714	0	5397
02/10/98	723.67	724.21	144705	0	714	0	0
02/11/98	723.64	724.20	143217	0	204	9020	748
02/12/98	723.64	724.20	142895	0	122	2122	511
02/13/98	723.71	724.19	139926	0	0	0	2802
02/14/98	723.92	724.22	146366	0	1463	0	0
02/15/98	723.77	724.22	146785	0	1676	0	0
02/16/98	723.72	724.21	144929	0	805	6367	0
02/17/98	723.78	724.21	144399	0	594	6898	736
02/18/98	723.94	724.23	149594	0	3304	20693	285
02/19/98	725.00	724.49	209462	169809	76286	0	720
02/20/98	724.55	724.78	276834	0	201706	1061	1433
02/21/98	724.03	724.62	238337	0	126062	0	1848
02/22/98	724.03	724.58	229601	0	110294	0	0
02/23/98	724.15	724.58	229601	0	110294	796	879
02/24/98	724.26	724.58	229601	0	110294	1592	980
02/25/98	724.34	724.55	223063	0	98877	0	0
02/26/98	724.10	724.56	225423	0	102958	0	0
02/27/98	723.91	724.41	189181	0	45925	1326	0
02/28/98	723.99	724.38	182409	0	36828	0	3610
03/01/98	723.92	724.37	180644	0	34554	531	3090
03/02/98	723.80	724.34	173778	0	26127	0	3685
03/03/98	723.68	724.31	166937	0	18459	1326	1384
03/04/98	723.59	724.28	161079	0	12561	1592	1442
03/05/98	723.90	724.29	162480	0	13910	0	2616
03/06/98	723.96	724.30	163815	0	15233	0	0
03/07/98	723.95	724.30	164295	0	15716	0	0
03/08/98	724.05	724.30	165647	0	17104	6632	1091
03/09/98	724.21	724.31	166890	0	18410	8489	750
03/10/98	724.38	724.31	168134	29254	19744	0	2960
03/11/98	724.58	724.36	177845	74907	31037	0	3998
03/12/98	724.90	724.59	231344	122074	113393	0	3515
03/13/98	724.67	724.60	233427	49407	117128	0	3732
03/14/98	723.94	724.51	213655	0	83076	0	0
03/15/98	723.85	724.46	202576	0	65498	0	4504
03/16/98	723.82	724.41	190375	0	47588	0	5498
03/17/98	723.76	724.36	179581	0	33205	3979	948
03/18/98	723.58	724.35	175897	0	28655	5571	1205
03/19/98	723.61	724.37	181524	0	35682	0	0
03/20/98	723.67	724.38	183092	0	37718	3979	971
03/21/98	723.72	724.38	184092	0	39034	8224	853
03/22/98	724.38	724.54	220954	0	95269	0	2882
03/23/98	725.33	724.78	276724	216785	201476	1061	0
03/24/98	726.12	725.01	332697	362964	325794	0	0
03/25/98	725.64	725.09	352954	246366	374171	0	2431
03/26/98	724.31	724.82	286466	0	0	0	6617
03/27/98	723.85	724.66	248466	0	0	0	6248
03/28/98	723.82	724.57	226631	0	0	0	3220

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
03/29/98	723.88	724.50	210576	0	0	0	5311
03/30/98	723.89	724.43	193596	0	0	0	5093
03/31/98	723.88	724.37	181733	0	0	0	4825
04/01/98	723.89	724.36	178500	0	31849	8224	0
04/02/98	723.92	724.35	176743	0	29682	0	1299
04/03/98	723.64	724.31	167432	0	18987	1061	965
04/04/98	723.53	724.29	163122	0	14541	1061	0
04/05/98	723.50	724.28	159192	0	10811	0	0
04/06/98	723.48	724.27	157671	0	9459	0	1921
04/07/98	723.46	724.26	156137	0	8151	19101	910
04/08/98	723.50	724.28	161152	0	12631	22285	0
04/09/98	723.75	724.35	176629	0	29543	25468	476
04/10/98	724.02	724.39	184375	0	39409	265	1896
04/11/98	724.07	724.38	182332	0	36727	0	1977
04/12/98	724.65	724.34	173454	96457	25747	0	1972
04/13/98	724.28	724.32	170486	0	22340	265	1636
04/14/98	723.86	724.32	169347	0	21071	1857	623
04/15/98	723.77	724.30	165827	0	17291	12999	858
04/16/98	723.81	724.29	163241	0	14660	58630	996
04/17/98	725.96	724.60	234863	359103	119724	0	1640
04/18/98	725.47	724.56	224705	276950	101712	0	1255
04/19/98	724.00	724.48	207131	0	72582	15387	154
04/20/98	724.60	724.47	204418	58921	68338	0	1713
04/21/98	724.40	724.46	202637	0	65591	6102	1138
04/22/98	726.30	724.47	204282	410291	68127	3979	1089
04/23/98	726.70	724.55	222313	464801	97590	0	1670
04/24/98	726.14	724.53	218995	386810	91952	0	1711
04/25/98	724.36	724.51	214129	0	83854	265	1378
04/26/98	724.13	724.49	209590	0	76490	19632	289
04/27/98	724.27	724.49	207748	0	73558	2653	1935
04/28/98	724.71	724.49	209112	86686	75726	0	2099
04/29/98	724.71	724.45	199728	92999	61174	1857	699
04/30/98	724.57	724.42	191982	59950	49852	11142	318
05/01/98	723.91	724.38	184100	0	39045	3184	1158
05/02/98	724.01	724.35	175237	0	27860	9285	0
05/03/98	724.61	724.39	185050	78030	40307	9816	2643
05/04/98	724.84	724.36	179164	143706	32680	3184	4007
05/05/98	724.41	724.32	170212	36309	22032	265	3407
05/06/98	725.23	724.28	159249	230103	10863	0	3814
05/07/98	725.53	724.12	123200	288842	0	4510	924
05/08/98	725.59	723.92	79754	298724	0	4245	2335
05/09/98	725.12	723.90	76817	209150	0	2388	2421
05/10/98	724.45	723.90	76393	82061	0	2122	3513
05/11/98	724.22	723.91	77987	49069	0	1857	1745
05/12/98	724.03	723.91	77135	20925	0	2918	3916
05/13/98	723.81	723.92	80378	0	0	265	3629
05/14/98	723.63	723.92	79931	0	0	0	4502
05/15/98	723.58	723.90	75878	0	0	0	4449
05/16/98	723.57	723.90	75973	0	0	0	3927
05/17/98	723.56	723.90	75828	0	0	0	4996
05/18/98	723.58	723.90	75828	0	0	0	4897
05/19/98	723.61	723.90	75828	0	0	265	4517
05/20/98	723.82	723.90	75815	0	0	0	4451
05/21/98	723.69	723.89	74085	0	0	6898	4989
05/22/98	723.54	723.89	73002	0	0	0	3333
05/23/98	723.45	723.88	71492	0	0	6367	5948
05/24/98	723.51	723.88	71492	0	0	5041	7253
05/25/98	723.60	723.88	71492	0	0	531	2507
05/26/98	723.58	723.88	71492	0	0	531	19935

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
05/27/98	723.52	723.88	71492	0	0	0	19127
05/28/98	723.55	723.88	72198	0	0	0	19131
05/29/98	723.70	723.88	71832	0	0	22285	11616
05/30/98	723.69	723.88	71492	0	0	4510	4089
05/31/98	723.80	723.88	71492	0	0	1857	2269
06/01/98	723.75	723.88	71492	0	0	531	4777
06/02/98	723.75	723.88	71492	0	0	531	4901
06/03/98	723.63	723.88	71492	0	0	265	13000
06/04/98	723.51	723.88	71492	0	0	265	0
06/05/98	723.51	723.88	71492	0	0	265	0
06/06/98	723.54	723.88	71492	0	0	265	0
06/07/98	723.54	723.88	71492	0	0	265	12831
06/08/98	723.53	723.88	71492	0	0	265	23753
06/09/98	723.52	723.88	71492	0	0	265	25262
06/10/98	723.51	723.88	71526	0	0	265	0
06/11/98	723.50	723.89	72593	0	0	796	14454
06/12/98	723.62	723.89	74049	0	0	1061	0
06/13/98	723.97	723.90	76082	13160	0	0	0
06/14/98	724.77	723.92	79909	138110	0	0	0
06/15/98	725.23	724.00	98547	231703	0	0	2003
06/16/98	725.63	724.47	204141	304629	67908	0	0
06/17/98	725.30	724.67	251527	227872	150910	0	0
06/18/98	724.45	724.45	200143	0	61799	0	4605
06/19/98	724.28	724.40	187434	0	43523	0	0
06/20/98	724.51	724.35	176437	58515	29309	0	4945
06/21/98	724.44	724.29	163452	51100	14869	0	1886
06/22/98	724.77	724.29	161659	134786	13115	0	0
06/23/98	724.16	724.30	164817	0	16248	0	0
06/24/98	723.75	724.27	157672	0	9459	0	0
06/25/98	723.68	724.24	151781	0	4778	0	0
06/26/98	723.79	724.19	140634	0	0	796	0
06/27/98	723.81	724.15	130741	0	0	0	0
06/28/98	723.76	724.17	134331	0	0	0	3531
06/29/98	724.26	724.13	125649	35456	0	1857	0
06/30/98	725.16	724.81	284108	159049	216990	0	3362
07/01/98	724.31	724.75	270769	0	189185	0	4895
07/02/98	725.70	724.90	305092	302063	262622	0	7067
07/03/98	727.06	725.28	401036	460140	494895	0	7423
07/04/98	727.09	725.33	414051	457733	528844	531	5784
07/05/98	727.06	725.37	423761	448478	554494	0	11780
07/06/98	727.03	725.35	419746	446450	543856	0	6586
07/07/98	726.58	725.23	388454	400661	462565	0	3330
07/08/98	724.48	724.82	285622	0	220208	0	8212
07/09/98	724.12	724.59	231255	0	113234	0	9661
07/10/98	724.06	724.50	210068	0	77257	0	8112
07/11/98	723.77	724.37	181356	0	35466	0	7837
07/12/98	723.68	724.31	167384	0	18936	0	7669
07/13/98	723.52	724.26	156618	0	8554	0	7454
07/14/98	723.54	724.22	145770	0	1176	0	2148
07/15/98	723.57	724.16	134006	0	0	0	6335
07/16/98	723.55	724.16	133217	0	0	0	14870
07/17/98	723.56	724.17	135407	0	0	0	13858
07/18/98	723.51	724.17	134699	0	0	0	10543
07/19/98	723.49	724.11	122098	0	0	265	10771
07/20/98	723.53	724.07	113437	0	0	531	7821
07/21/98	723.69	724.07	112385	0	0	0	6761
07/22/98	723.57	724.05	107876	0	0	0	7913
07/23/98	723.67	724.02	102271	0	0	0	4272
07/24/98	724.11	723.97	91077	27142	0	0	9692

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
07/25/98	724.13	723.97	91013	30522	0	0	6268
07/26/98	723.78	723.94	84168	0	0	0	5415
07/27/98	723.69	723.92	80102	0	0	0	6343
07/28/98	723.69	723.45	16104	4249	0	0	5910
07/29/98	723.56	723.61	12967	0	0	0	5123
07/30/98	723.47	723.46	16518	0	0	0	2363
07/31/98	723.46	723.14	4905	0	0	0	6636
08/01/98	723.49	723.00	0	0	0	0	3795
08/02/98	723.47	723.00	0	0	0	0	3476
08/03/98	723.45	723.00	0	0	0	0	2656
08/04/98	723.43	723.00	0	0	0	0	1724
08/05/98	723.45	723.00	0	0	0	0	1225
08/06/98	723.44	723.00	0	0	0	0	4333
08/07/98	723.42	723.00	0	0	0	0	4473
08/08/98	723.44	723.00	0	0	0	0	2733
08/09/98	723.45	723.00	0	0	0	0	2170
08/10/98	723.45	723.00	0	0	0	6367	4836
08/11/98	723.78	723.00	0	8323	0	0	3811
08/12/98	724.06	723.00	0	30153	0	0	7429
08/13/98	723.50	723.00	0	0	0	0	4310
08/14/98	723.46	723.00	0	0	0	0	6954
08/15/98	723.46	723.00	0	0	0	0	3250
08/16/98	723.46	723.00	0	0	0	0	5184
08/17/98	723.45	723.00	0	0	0	0	7355
08/18/98	723.45	723.00	0	0	0	0	12987
08/19/98	723.46	723.00	0	0	0	0	8274
08/20/98	723.48	723.00	0	0	0	0	7203
08/21/98	723.46	723.00	0	0	0	0	6597
08/22/98	723.45	723.00	0	0	0	0	2916
08/23/98	723.45	723.00	0	0	0	0	2620
08/24/98	723.42	723.00	0	0	0	3714	2356
08/25/98	723.41	723.00	0	0	0	22815	0
08/26/98	723.41	723.00	0	0	0	265	3151
08/27/98	723.41	723.00	0	0	0	0	3305
08/28/98	723.41	723.00	0	0	0	0	2970
08/29/98	723.41	723.00	0	0	0	2653	2750
08/30/98	723.41	723.00	0	0	0	0	2730
08/31/98	723.41	723.00	0	0	0	0	2624
09/01/98	723.41	723.00	0	0	0	0	2720
09/02/98	723.41	723.00	0	0	0	0	2943
09/03/98	723.41	723.00	0	0	0	0	3037
09/04/98	723.41	723.00	0	0	0	0	2346
09/05/98	723.41	723.00	0	0	0	0	3273
09/06/98	723.41	723.00	0	0	0	0	2915
09/07/98	723.40	723.00	0	0	0	10612	1127
09/08/98	723.39	723.00	0	0	0	0	2859
09/09/98	723.38	723.00	0	0	0	0	3097
09/10/98	723.37	723.00	0	0	0	0	3242
09/11/98	723.38	723.00	0	0	0	0	3040
09/12/98	723.38	723.00	0	0	0	0	3075
09/13/98	723.39	723.00	0	0	0	0	2998
09/14/98	723.39	723.00	0	0	0	0	2211
09/15/98	723.39	723.00	0	0	0	0	2025
09/16/98	723.39	723.00	0	0	0	0	1490
09/17/98	723.36	723.00	0	0	0	0	1930
09/18/98	723.32	723.00	0	0	0	0	2437
09/19/98	723.31	723.00	0	0	0	265	2132
09/20/98	723.32	723.00	0	0	0	0	2185
09/21/98	723.32	723.00	0	0	0	796	1702

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
09/22/98	723.33	723.00	0	0	0	7959	1764
09/23/98	723.34	723.00	0	0	0	0	2745
09/24/98	723.34	723.00	0	0	0	0	2380
09/25/98	723.35	723.00	0	0	0	0	1350
09/26/98	723.35	723.00	0	0	0	0	2474
09/27/98	723.36	723.00	0	0	0	4775	1901
09/28/98	723.36	723.00	0	0	0	0	2673
09/29/98	723.37	723.00	0	0	0	0	2678
09/30/98	723.37	723.00	0	0	0	0	2154
10/01/98	723.38	723.00	0	0	0	0	1305
10/02/98	723.39	723.00	0	0	0	0	875
10/03/98	723.39	723.00	0	0	0	19632	35
10/04/98	723.40	723.00	0	0	0	0	381
10/05/98	723.40	723.00	0	0	0	0	820
10/06/98	723.41	723.00	0	0	0	0	905
10/07/98	723.42	723.00	0	0	0	36080	94
10/08/98	723.43	723.00	0	0	0	0	442
10/09/98	723.56	723.00	0	580	0	0	410
10/10/98	723.45	723.00	0	0	0	0	1158
10/11/98	723.43	723.16	5740	0	0	0	1108
10/12/98	723.41	723.62	16922	0	0	0	1064
10/13/98	723.26	723.72	38229	0	0	0	1094
10/14/98	723.42	723.75	42825	0	0	0	702
10/15/98	723.44	723.76	44742	0	0	0	884
10/16/98	723.47	723.74	42284	0	0	0	973
10/17/98	723.46	723.75	44154	0	0	0	901
10/18/98	723.47	723.75	42987	0	0	12203	172
10/19/98	723.55	723.78	49864	0	0	0	1012
10/20/98	723.55	723.78	49754	0	0	0	1083
10/21/98	723.46	723.76	45574	0	0	1061	634
10/22/98	723.42	723.75	42697	0	0	0	859
10/23/98	723.43	723.74	42105	0	0	0	1012
10/24/98	723.43	723.73	39437	0	0	0	1019
10/25/98	723.44	723.75	42525	0	0	0	730
10/26/98	723.45	723.75	43026	0	0	0	794
10/27/98	723.44	723.75	42952	0	0	0	446
10/28/98	723.45	723.74	42104	0	0	265	196
10/29/98	723.46	723.74	41627	0	0	0	926
10/30/98	723.50	723.76	46227	0	0	12469	299
10/31/98	723.79	723.78	50971	1831	0	0	590
11/01/98	723.84	723.79	52114	7315	0	0	71
11/02/98	723.60	723.72	37824	0	0	7428	55
11/03/98	723.46	723.69	29994	0	0	1326	56
11/04/98	723.50	723.87	68528	0	0	0	127
11/05/98	723.46	723.89	73100	0	0	0	95
11/06/98	723.45	723.89	73599	0	0	0	0
11/07/98	723.46	723.88	71853	0	0	0	212
11/08/98	723.47	723.86	67961	0	0	0	67
11/09/98	723.47	723.82	59143	0	0	0	127
11/10/98	723.48	723.80	53269	0	0	15122	49
11/11/98	723.64	723.81	56350	0	0	0	224
11/12/98	723.72	723.87	69380	0	0	0	187
11/13/98	723.60	723.88	70667	0	0	0	138
11/14/98	723.57	723.89	73154	0	0	0	165
11/15/98	723.61	723.93	82027	0	0	0	187
11/16/98	723.80	723.96	88850	0	0	0	136
11/17/98	723.80	723.98	94372	0	0	0	55
11/18/98	723.61	724.00	97591	0	0	0	0
11/19/98	723.63	723.98	93850	0	0	0	37

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
11/20/98	723.62	723.99	95786	0	0	7428	142
11/21/98	723.71	724.02	102769	0	0	0	0
11/22/98	723.66	724.02	101162	0	0	0	0
11/23/98	723.64	724.00	98013	0	0	0	59
11/24/98	723.65	723.99	95863	0	0	0	0
11/25/98	723.67	723.97	91739	0	0	11142	67
11/26/98	723.67	723.98	93018	0	0	2918	193
11/27/98	723.68	723.98	93278	0	0	0	0
11/28/98	723.68	723.98	93278	0	0	0	186
11/29/98	723.57	723.97	92008	0	0	0	99
11/30/98	723.51	723.96	88505	0	0	265	110
12/01/98	723.50	723.93	81405	0	0	0	101
12/02/98	723.51	723.90	76642	0	0	0	87
12/03/98	723.49	723.88	72080	0	0	0	27
12/04/98	723.48	723.86	67832	0	0	0	14
12/05/98	723.48	723.85	65178	0	0	0	38
12/06/98	723.47	723.83	59683	0	0	0	31
12/07/98	723.44	723.82	57596	0	0	9020	9
12/08/98	723.54	723.83	61120	0	0	0	9
12/09/98	723.72	723.83	59850	0	0	0	0
12/10/98	723.58	723.81	55950	0	0	265	0
12/11/98	723.48	723.79	52395	0	0	0	0
12/12/98	723.45	723.78	49165	0	0	0	0
12/13/98	723.43	723.78	49661	0	0	0	0
12/14/98	723.41	723.77	47381	0	0	0	0
12/15/98	723.40	723.77	46976	0	0	0	0
12/16/98	723.40	723.78	49840	0	0	5571	0
12/17/98	723.38	723.78	50642	0	0	1326	0
12/18/98	723.40	723.80	54203	0	0	0	0
12/19/98	723.40	723.79	52478	0	0	265	4
12/20/98	723.40	723.79	52114	0	0	531	5
12/21/98	723.41	723.79	52114	0	0	56773	0
12/22/98	723.61	723.81	56817	0	0	265	0
12/23/98	724.33	724.29	163271	21868	14689	0	0
12/24/98	724.48	724.37	180240	47879	34039	0	0
12/25/98	724.15	724.35	177008	0	0	0	0
12/26/98	724.24	724.34	174339	0	0	0	0
12/27/98	723.61	724.32	169073	0	0	0	0
12/28/98	723.48	724.30	164469	0	0	0	0
12/29/98	723.43	724.25	152729	0	0	1592	0
12/30/98	723.46	724.22	146647	0	0	0	0
12/31/98	723.46	723.82	59467	0	0	0	0
01/01/99	723.41	724.20	142147	0	0	0	0
01/02/99	723.41	724.25	153395	0	0	701	740
01/03/99	723.45	724.24	151841	0	0	42895	508
01/04/99	723.50	724.23	149471	0	0	5316	584
01/05/99	723.54	724.22	146343	0	0	701	1166
01/06/99	723.52	724.20	143124	0	0	701	1502
01/07/99	723.52	724.20	142147	0	0	701	1773
01/08/99	723.58	724.20	142794	0	0	3338	5482
01/09/99	723.67	724.21	144957	0	0	701	3895
01/10/99	723.68	724.22	147359	0	0	2019	455
01/11/99	723.71	724.32	168545	0	0	701	2265
01/12/99	723.71	724.34	175037	0	0	701	2661

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
01/13/99	723.71	724.28	159215	0	0	22457	5617
01/14/99	723.87	724.26	154615	0	0	15205	5349
01/15/99	723.86	724.33	171662	0	0	701	5530
01/16/99	723.81	724.34	173984	0	0	701	1821
01/17/99	723.86	724.34	173918	0	0	27732	2265
01/18/99	724.01	724.33	172664	0	0	15205	6023
01/19/99	725.08	724.60	234191	173894	118508	1360	5646
01/20/99	724.73	724.90	305034	0	0	701	3471
01/21/99	725.40	725.08	351657	169359	371026	1360	5045
01/22/99	725.95	725.11	357226	317335	384572	25754	5312
01/23/99	726.13	725.13	362246	345082	396881	701	903
01/24/99	725.10	724.90	306600	114121	265985	701	1837
01/25/99	724.95	724.83	288257	79074	225835	701	283
01/26/99	726.95	725.08	351176	470914	369861	701	2187
01/27/99	727.02	725.29	404562	453101	504042	701	1830
01/28/99	726.97	725.30	404947	446348	505045	701	470
01/29/99	725.96	725.13	364231	313517	401774	701	3900
01/30/99	724.65	724.81	283850	0	0	701	6435
01/31/99	724.07	724.61	236976	0	0	701	4147
02/01/99	724.00	724.55	222583	0	0	701	1465
02/02/99	724.01	724.54	220214	0	0	13887	10143
02/03/99	723.92	724.56	224404	0	0	7294	6372
02/04/99	723.75	724.54	219132	0	0	701	1263
02/05/99	723.78	724.51	212583	0	0	2019	2385
02/06/99	723.99	724.50	211023	0	0	701	11197
02/07/99	723.76	724.50	210868	0	0	2019	15110
02/08/99	724.06	724.46	202497	0	0	62015	11948
02/09/99	724.52	724.49	208668	25736	75018	701	13284
02/10/99	725.30	724.75	270299	214048	188223	701	9616
02/11/99	725.11	724.79	280248	146419	208843	701	1800
02/12/99	724.34	724.74	268701	0	0	701	2267
02/13/99	724.18	724.66	249297	0	0	9931	8118
02/14/99	724.13	724.58	228564	0	0	701	13470
02/15/99	724.08	724.56	225672	0	0	701	13102
02/16/99	724.06	724.52	215297	0	0	701	2454
02/17/99	723.77	724.50	210489	0	0	4657	1678
02/18/99	723.76	724.49	209576	0	0	3997	908
02/19/99	723.98	724.49	208664	0	0	701	2130
02/20/99	723.88	724.49	207752	0	0	701	3815
02/21/99	723.84	724.48	206840	0	0	701	5936
02/22/99	723.83	724.43	194547	0	0	701	10489
02/23/99	723.65	724.37	181215	0	0	701	2275
02/24/99	723.52	724.37	180794	0	0	701	4726
02/25/99	723.52	724.37	180794	0	0	2019	15012
02/26/99	723.91	724.37	180287	0	0	12568	10947
02/27/99	723.72	724.37	181230	0	0	701	12410
02/28/99	723.74	724.39	185284	0	0	36962	8949
03/01/99	724.23	724.51	213024	0	0	5316	8100
03/02/99	725.88	724.68	254235	344003	156157	701	8387
03/03/99	725.89	724.79	280240	346223	208827	5975	3541

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
03/04/99	725.57	724.83	289326	278567	228130	14546	4161
03/05/99	725.35	724.84	292405	209547	234768	701	7217
03/09/99	725.61	724.82	286818	292297	222758	701	2840
03/10/99	725.98	724.98	325441	345128	308870	11249	7957
03/11/99	724.81	724.75	269235	49736	186050	701	9950
03/12/99	724.15	724.62	240094	0	0	701	9020
03/13/99	724.06	724.48	205784	0	0	701	9891
03/14/99	724.05	724.44	197219	0	0	701	11859
03/15/99	723.99	724.41	189700	0	0	701	11860
03/16/99	723.99	724.40	188108	0	0	701	12039
03/17/99	723.97	724.39	184945	0	0	701	2516
03/18/99	723.95	724.37	180536	0	0	701	3920
03/19/99	724.49	724.44	196551	33257	56451	701	7262
03/20/99	725.33	724.65	246768	240329	141808	701	2415
03/21/99	724.91	724.68	253257	105312	154257	701	3025
03/22/99	723.91	724.56	224840	0	0	701	7672
03/23/99	723.91	724.42	192735	0	0	701	10124
03/24/99	723.97	724.39	185775	0	0	701	12375
03/25/99	723.84	724.36	179085	0	0	701	7947
03/26/99	723.72	724.32	169920	0	0	701	16651
03/27/99	723.69	724.32	169347	0	0	701	14588
03/28/99	723.66	724.33	172549	0	0	701	9065
03/29/99	723.67	724.37	180255	0	0	701	9949
03/30/99	723.67	724.34	173511	0	0	701	10834
03/31/99	723.59	724.21	144220	0	0	701	11719
04/01/99	723.62	724.20	142147	0	0	701	2519
04/02/99	723.73	724.20	142033	0	0	5316	3157
04/03/99	723.64	724.18	138353	0	0	701	2350
04/04/99	723.54	724.17	135307	0	0	7953	2355
04/05/99	723.56	724.16	133165	0	0	2019	4907
04/06/99	723.52	724.16	132431	0	0	701	4451
04/07/99	723.48	724.14	128691	0	0	701	2502
04/08/99	723.47	724.11	121982	0	0	701	3079
04/09/99	723.47	724.09	117908	0	0	5316	1810
04/10/99	723.69	724.11	121266	0	0	29709	4850
04/11/99	724.14	724.31	166875	0	0	701	5019
04/12/99	726.08	724.87	299086	377349	249339	701	4866
04/13/99	725.61	724.94	314813	270118	284483	1360	3726
04/14/99	724.80	724.65	246011	77025	140374	701	1683
04/15/99	724.25	724.48	205865	0	0	701	2238
04/16/99	723.75	724.43	195664	0	0	17842	2802
04/17/99	723.92	724.43	195435	0	0	4657	4003
04/18/99	724.14	724.42	193163	0	0	2679	2722
04/19/99	724.65	724.44	196165	79598	55884	13887	1052
04/20/99	725.77	724.82	285965	326354	220938	2679	4108
04/21/99	726.20	725.05	344129	369716	352899	701	2871
04/22/99	726.38	725.14	364306	384196	401958	58059	3013
04/23/99	725.85	725.05	343482	307680	351351	701	4258
04/24/99	725.01	724.77	275425	115579	198777	46851	4205

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
04/25/99	725.20	724.72	263528	187308	174515	701	3038
04/26/99	724.95	724.68	253965	119540	155633	701	1430
04/27/99	724.44	724.87	300009	0	0	701	4984
04/28/99	724.06	724.51	212598	0	0	2019	4738
04/29/99	724.04	724.40	187412	0	0	701	4146
04/30/99	723.97	724.36	177555	0	0	701	3553
05/01/99	723.87	724.32	168715	0	0	0	809
05/02/99	723.78	724.29	163431	0	0	0	4043
05/03/99	723.70	724.28	159334	0	0	0	3234
05/04/99	723.69	724.27	157788	0	0	0	809
05/05/99	723.73	724.27	157527	0	0	0	0
05/06/99	723.75	724.27	157267	0	0	4717	0
05/07/99	723.75	724.27	157006	0	0	0	1617
05/08/99	723.74	724.25	152534	0	0	4717	809
05/09/99	723.75	724.24	150695	0	0	0	1617
05/10/99	723.75	724.22	146272	0	0	674	0
05/11/99	723.74	724.20	142523	0	0	0	1617
05/12/99	723.59	724.19	139394	0	0	0	4043
05/13/99	723.48	724.18	136885	0	0	0	38005
05/14/99	723.47	724.17	134633	0	0	0	0
05/15/99	723.45	724.13	127065	0	0	2695	0
05/16/99	723.45	724.10	120727	0	0	0	3234
05/17/99	723.46	724.08	114410	0	0	0	8895
05/18/99	723.49	724.04	106873	0	0	0	0
05/19/99	723.62	724.02	101365	0	0	0	0
05/20/99	723.65	723.99	96164	0	0	4043	0
05/21/99	723.64	723.96	88875	0	0	0	809
05/22/99	723.58	723.92	80144	0	0	0	0
05/23/99	723.80	723.89	73799	0	0	0	61454
05/24/99	723.72	723.89	73092	0	0	33692	0
05/25/99	723.65	723.96	88606	0	0	6738	1617
05/26/99	724.21	724.00	97047	40334	0	22237	6469
05/27/99	724.29	724.01	100494	54116	0	674	1617
05/28/99	723.90	724.05	107772	0	0	0	7278
05/29/99	723.53	724.02	102103	0	0	0	1617
05/30/99	723.47	724.01	99283	0	0	0	3234
05/31/99	723.47	724.00	97588	0	0	0	13746
06/01/99	723.47	723.98	94073	0	0	1348	0
06/02/99	723.49	723.96	87915	0	0	4043	1617
06/03/99	723.51	723.93	81843	0	0	0	0
06/04/99	723.51	723.95	86380	0	0	0	4852
06/05/99	723.53	723.95	85924	0	0	0	3234
06/06/99	723.55	723.95	86475	0	0	0	4043
06/07/99	723.55	723.93	83170	0	0	0	3234
06/08/99	723.57	723.90	76030	0	0	0	6469
06/09/99	723.54	723.88	71492	0	0	0	4852
06/10/99	723.49	723.87	69062	0	0	0	5660
06/11/99	723.45	723.81	56196	0	0	0	5660
06/12/99	723.45	723.80	54256	0	0	0	5660

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
06/13/99	723.42	723.80	54256	0	0	0	8086
06/14/99	723.41	723.80	54960	0	0	29649	0
06/15/99	723.45	723.80	54298	0	0	0	809
06/16/99	723.49	723.93	83078	0	0	0	2426
06/17/99	723.45	723.80	54256	0	0	674	809
06/18/99	723.48	723.80	54256	0	0	0	3234
06/19/99	723.46	723.80	54256	0	0	0	3234
06/20/99	723.43	723.80	54256	0	0	0	6469
06/21/99	723.41	723.80	54256	0	0	0	12129
06/22/99	723.41	723.80	54256	0	0	0	16981
06/23/99	723.41	723.80	54231	0	0	0	0
06/24/99	723.41	723.78	50849	0	0	0	0
06/25/99	723.40	723.78	49481	0	0	0	809
06/26/99	723.41	723.76	46281	0	0	0	1617
06/27/99	723.40	723.77	48385	0	0	32344	1617
06/28/99	723.60	723.82	58862	0	0	38409	0
06/29/99	723.43	723.83	61318	0	0	2022	0
06/30/99	723.43	723.83	60034	0	0	0	1617
07/01/99	723.41	723.82	58240	0	0	82487	13353
07/02/99	723.42	723.83	61380	0	0	499	18101
07/03/99	724.09	723.93	82994	28080	0	499	18160
07/04/99	723.76	723.89	73260	0	0	499	17229
07/05/99	723.62	723.86	67989	0	0	499	27722
07/06/99	723.55	723.86	67026	0	0	499	15351
07/07/99	723.53	723.84	63645	0	0	499	10526
07/08/99	723.53	723.84	63699	0	0	499	21472
07/09/99	723.51	723.83	59741	0	0	40539	23882
07/10/99	723.52	723.77	47900	0	0	499	20487
07/11/99	723.59	723.82	59031	0	0	499	19836
07/12/99	724.82	723.82	58864	149369	0	499	19389
07/13/99	723.60	723.81	55664	0	0	499	16688
07/14/99	723.39	723.61	13565	0	0	499	7229
07/15/99	723.39	723.35	12706	0	0	499	19703
07/16/99	723.39	723.10	3635	0	0	499	37340
07/17/99	723.41	723.00	0	0	0	499	33795
07/18/99	723.41	723.00	0	0	0	499	26875
07/19/99	723.39	723.00	0	0	0	9397	26109
07/20/99	723.38	723.00	0	0	0	29735	19418
07/21/99	723.45	723.23	8405	0	0	29735	17661
07/22/99	723.46	723.34	12269	0	0	499	18559
07/23/99	723.53	723.42	15035	171	0	499	13146
07/24/99	723.46	723.02	758	0	0	499	23169
07/25/99	724.06	723.28	9966	30096	0	499	15560
07/26/99	723.67	723.01	389	3368	0	499	14148
07/27/99	723.47	723.66	25526	0	0	499	15928
07/28/99	723.64	723.79	52179	0	0	499	14678
07/29/99	723.54	723.76	46312	0	0	499	14345
07/30/99	723.54	723.54	-1562	125	0	499	14012

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
07/31/99	723.45	723.00	0	0	0	499	13679
08/01/99	723.46	723.00	0	0	0	499	9505
08/02/99	723.50	723.00	0	0	0	499	8482
08/03/99	723.48	723.00	0	0	0	499	6351
08/04/99	723.44	723.00	0	0	0	499	4168
08/05/99	723.43	723.00	0	0	0	499	4428
08/06/99	723.43	723.00	0	0	0	499	11065
08/07/99	723.43	723.00	0	0	0	499	10625
08/08/99	723.43	723.00	0	0	0	499	6703
08/09/99	723.46	723.00	0	0	0	499	6640
08/10/99	723.46	723.00	0	0	0	499	11849
08/11/99	723.43	723.00	0	0	0	499	11212
08/12/99	723.42	723.00	0	0	0	499	17549
08/13/99	723.41	723.00	0	0	0	1770	12066
08/14/99	723.48	723.00	0	0	0	499	16095
08/15/99	723.50	723.00	0	4	0	499	9074
08/16/99	723.46	723.00	0	0	0	499	14087
08/17/99	723.41	723.00	0	0	0	499	21065
08/18/99	723.41	723.00	0	0	0	499	30991
08/19/99	723.42	723.00	0	0	0	499	20562
08/20/99	723.43	723.00	0	0	0	499	18039
08/21/99	723.43	723.00	0	0	0	499	15198
08/22/99	723.42	723.00	0	0	0	499	7281
08/23/99	723.42	723.00	0	0	0	499	6544
08/24/99	723.41	723.00	0	0	0	499	5935
08/25/99	723.56	723.00	0	603	0	499	6067
08/26/99	723.58	723.00	0	1056	0	499	8069
08/27/99	723.54	723.00	0	321	0	499	8253
08/28/99	723.48	723.00	0	0	0	499	7451
08/29/99	723.45	723.00	0	0	0	499	7358
08/30/99	723.42	723.00	0	0	0	499	7264
08/31/99	723.40	723.00	0	0	0	499	7171
09/01/99	723.40	723.00	0	0	0	0	3234
09/02/99	723.40	723.00	0	0	0	0	10512
09/03/99	723.39	723.00	0	0	0	0	1617
09/04/99	723.40	723.00	0	0	0	0	3234
09/05/99	723.38	723.00	0	0	0	0	8895
09/06/99	723.37	723.00	0	0	0	46495	20215
09/07/99	723.40	723.00	0	0	0	0	809
09/08/99	723.55	723.00	0	547	0	0	0
09/09/99	723.46	723.00	0	0	0	0	1617
09/10/99	723.41	723.00	0	0	0	0	0
09/11/99	723.39	723.00	0	0	0	0	35579
09/12/99	723.39	723.00	0	0	0	0	0
09/13/99	723.39	723.00	0	0	0	0	0
09/14/99	723.39	723.00	0	0	0	0	12129
09/15/99	723.39	723.00	0	0	0	0	5660
09/16/99	723.39	723.00	0	0	0	0	5660
09/17/99	723.39	723.00	0	0	0	0	2426
09/18/99	723.39	723.00	0	0	0	0	5660
09/19/99	723.39	723.00	0	0	0	6065	25876
09/20/99	723.40	723.00	0	0	0	1348	4852
09/21/99	723.40	723.00	0	0	0	0	4043

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
09/22/99	723.43	723.00	0	0	0	0	26684
09/23/99	723.44	723.00	0	0	0	0	2426
09/24/99	723.46	723.00	0	0	0	0	1617
09/25/99	723.41	723.00	0	0	0	0	5660
09/26/99	723.42	723.00	0	0	0	2695	809
09/27/99	723.43	723.00	0	0	0	0	7278
09/28/99	723.42	723.00	0	0	0	50538	0
09/29/99	723.45	723.00	0	0	0	2695	0
09/30/99	723.50	723.00	0	0	0	0	0
10/01/99	723.70	723.00	0	4541	0	0	1617
10/02/99	723.49	723.00	0	0	0	0	809
10/03/99	723.41	723.00	0	0	0	3369	0
10/04/99	723.40	723.00	0	0	0	2695	809
10/05/99	723.42	723.00	0	0	0	0	0
10/06/99	723.42	723.00	0	0	0	0	1617
10/07/99	723.42	723.00	0	0	0	0	50134
10/08/99	723.41	723.00	0	0	0	8086	57411
10/09/99	723.42	723.00	0	0	0	20889	0
10/10/99	723.44	723.00	0	0	0	5391	6469
10/11/99	723.59	723.00	0	1300	0	0	35579
10/12/99	723.49	723.00	0	0	0	0	1617
10/13/99	723.44	723.00	0	0	0	24258	0
10/14/99	723.51	723.28	10164	72	0	0	52560
10/15/99	723.57	723.11	3872	860	0	0	5660
10/16/99	723.50	723.00	0	0	0	0	2426
10/17/99	723.45	723.00	0	0	0	8086	809
10/18/99	723.46	723.00	0	0	0	674	0
10/19/99	723.49	723.00	0	0	0	0	1617
10/20/99	723.47	723.00	0	0	0	0	28301
10/21/99	723.42	723.00	0	0	0	0	1617
10/22/99	723.40	723.00	0	0	0	0	0
10/23/99	723.42	723.00	0	0	0	2022	0
10/24/99	723.41	723.00	0	0	0	0	0
10/25/99	723.42	723.00	0	0	0	0	0
10/26/99	723.46	723.00	0	0	0	0	1617
10/27/99	723.42	723.00	0	0	0	0	809
10/28/99	723.39	723.00	0	0	0	0	809
10/29/99	723.39	723.00	0	0	0	0	2426
10/30/99	723.40	723.00	0	0	0	0	1617
10/31/99	723.41	723.00	0	0	0	0	12938
11/01/99	723.41	723.00	0	0	0	0	0
11/02/99	723.47	723.00	0	0	0	81535	809
11/03/99	723.92	723.32	11641	17436	0	5391	0
11/04/99	723.85	723.80	54192	7556	0	0	0
11/05/99	723.57	723.12	4427	844	0	0	0
11/06/99	723.46	723.00	0	0	0	0	1617
11/07/99	723.43	723.00	0	0	0	0	0
11/08/99	723.42	723.00	0	0	0	0	1617
11/09/99	723.42	723.00	0	0	0	0	2426

Date	River (ft)	Billabong (ft)	Volume (ft ³)	Inflow (ft ³)	Outflow (ft ³)	Precipitation(ft ³)	ET (ft ³)
11/10/99	723.41	723.00	0	0	0	0	0
11/11/99	723.41	723.00	0	0	0	0	0
11/12/99	723.46	723.00	0	0	0	0	0
11/13/99	723.47	723.00	0	0	0	0	0
11/14/99	723.48	723.00	0	0	0	0	14555
11/15/99	723.51	723.00	0	23	0	0	1617
11/16/99	723.51	723.00	0	24	0	0	4043
11/17/99	723.50	723.00	0	7	0	0	0
11/18/99	723.49	723.00	0	0	0	0	3234
11/19/99	723.49	723.00	0	0	0	674	0
11/20/99	723.50	723.00	0	0	0	2695	0
11/21/99	723.51	723.00	0	31	0	0	0
11/22/99	723.47	723.00	0	0	0	0	1617
11/23/99	723.44	723.00	0	0	0	0	7278
11/24/99	723.43	723.00	0	0	0	2022	0
11/25/99	723.44	723.00	0	0	0	4043	0
11/26/99	723.53	723.00	0	198	0	27628	0
11/27/99	723.62	723.00	0	1907	0	0	0
11/28/99	723.53	723.00	0	178	0	0	3234
11/29/99	723.46	723.00	0	0	0	0	809
11/30/99	723.43	723.00	0	0	0	0	3234
12/01/99	723.41	723.02	809	0	0	0	0
12/02/99	723.40	723.67	25711	0	0	0	0
12/03/99	723.40	723.81	55742	0	0	0	0
12/04/99	723.43	723.81	56402	0	0	0	0
12/05/99	723.38	723.81	56574	0	0	18194	0
12/06/99	723.42	723.84	62297	0	0	0	0
12/07/99	723.45	723.83	60385	0	0	0	0
12/08/99	723.46	723.80	54884	0	0	674	0
12/09/99	723.43	723.80	55006	0	0	0	1617
12/10/99	723.43	723.81	56373	0	0	42452	0
12/11/99	723.74	723.85	64810	0	0	0	0
12/12/99	723.82	723.87	69190	0	0	16172	0
12/13/99	723.78	723.89	73846	0	0	10781	0
12/14/99	724.05	723.86	66775	26955	0	74797	0
12/15/99	724.92	723.99	96240	168742	0	674	0
12/16/99	724.48	724.19	140477	75433	0	0	0
12/17/99	725.05	724.47	203255	187179	66540	0	0
12/18/99	724.78	724.62	239173	78457	127602	0	0
12/19/99	724.04	724.60	235181	0	0	0	0
12/20/99	723.88	724.60	234331	0	0	5391	0
12/21/99	723.86	724.61	237470	0	0	0	0
12/22/99	723.71	724.60	235103	0	0	0	6469
12/23/99	723.66	724.60	234237	0	0	0	2426
12/24/99	723.58	724.59	232135	0	0	0	1617
12/25/99	723.55	724.56	225239	0	0	0	2426
12/26/99	723.59	724.54	220743	0	0	0	0
12/27/99	724.87	724.56	224144	118844	100742	0	0
12/28/99	723.94	724.46	202379	0	0	0	0

Date	River (ft)	Billabong (ft)	Volume (ft³)	Inflow (ft³)	Outflow (ft³)	Precipitation(ft³)	ET (ft³)
12/29/99	723.96	724.45	200291	0	0	6065	1617
12/30/99	724.45	724.47	204760	0	0	0	1617
12/31/99	724.45	723.99	94741	82101	0	0	0